FY 2004 Summary Appraisal Report

Fermi National Accelerator Laboratory

October 1, 2003 through September 30, 2004

March 15, 2005

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Introduction

On December 27, 2001, the Universities Research Association (URA) and the U.S. Department of Energy (DOE) executed a new, 5-year, performance-based contract for the management and operation of Fermi National Accelerator Laboratory (Fermilab). The new 5-year contract began January 1, 2002. This contract includes a performance fee based on a set of performance measures for critical outcomes. The performance measures established at the beginning of each performance period serve as standards for evaluating URA's performance, both for the Critical Outcomes and the Self-Assessment Measures. The performance period for this evaluation extends from October 1, 2003, through September 30, 2004.

The DOE Fermi Site Office (FSO) uses the URA Self-Assessment Report, the DOE Headquarters (HQ) performance evaluation, input from the DOE Chicago Office (CH) staff that directly supports the FSO, and the FSO Operational Awareness Program to determine DOE ratings for the four Critical Outcomes.

DOE also reviewed the Self-Assessment quality for each division's and section's performance beyond the performance measures. DOE considered whether the Self-Assessment Report either addressed directly or otherwise incorporated the following efforts:

- Assessment of performance against a contract performance measure;
- Description of status of a program/project/activity;
- Description of the bases for determining performance, e.g., procedures, business systems, records, tracking/trending, performance reviews, statistics, etc.;
- Identification of successes;
- Identification of weaknesses and/or needs for improvement; and
- Identification of the path forward to address needs.

Performance Fee Earned

In accordance with Appendix B, Attachments 2 and 2a, following is a summary of earned performance fee based on the performance ratings contained in this appraisal:

Performance Measure	Rating	Fee Earned $
Science	Outstanding	1,017,000
Leadership	Outstanding	94,920
Mission Support	Outstanding	122,040
Self Assessment	Excellent	91,530
TOTAL		1,325,490

Contract Clause I.102, Payment and Advances, includes a provisional fee payment based on a rating of Outstanding in Science and Excellent in Operations that resulted in a provisional fee payment of $1,271,250. The total fee pool available was $1,356,000. The fee earned as outlined above amounted to $ 1,325,490. Based on the DOE determination of total available fee earned, Fermilab is authorized to withdraw an additional $54,240, which is the amount of earned fee over the amount previously paid on a provisional basis, from the payments cleared financing arrangement in accordance with Contract Clause I.102.

Overall Performance

This section summarizes overall performance ratings for the contract performance measures. The following ratings reflect DOE's overall assessment of URA's performance, including all sources of input and information such as activities, performance measures, and the 2004 URA Self-Assessment Report. The organization of the performance ratings follows the organization presented in the FY 2004 Performance Plan (Appendix B to the DOE-URA contract).

CRITICAL OUTCOMES	DOE Rating
I. Science Programs: 75%	
A. Science	**Outstanding**
A.1 Quality of Research (30%)	Outstanding
A.2 Success in Constructing and Operating Research Facilities (25%)	Outstanding
A.3 Effective, Efficient and Safe Research Program Management (15%)	Excellent
A.4 Relevance to DOE Missions and National Needs (5%)	Outstanding
II. Operations Management: 25%	**Outstanding**
B. Leadership (7%)	Outstanding
C. Mission Support (9%)	Outstanding
D. Self-Assessment (9%)	Excellent

Critical Outcomes

I. Science Programs

A. SCIENCE REVIEW

Critical Outcome: Advance the understanding of the fundamental nature of matter and energy by conducting research at the frontier of high-energy physics and related disciplines.

1. **Quality of research**
2. **Success in constructing and operating research facilities**
3. **Effectiveness and efficiency of research program management**
4. **Relevance to DOE missions and national needs**

DOE Rating: **Outstanding.**

Attachment 1 contains the DOE Assessment.

II. Operations Management

B. LEADERSHIP

Critical Outcome: Provide the leadership to ensure operational excellence and foster responsible stewardship of the DOE resources.

1. **Assess operations functions and management systems**
2. **Promote operational and management system excellence**

DOE Rating: **Outstanding**.

The DOE rating for the Leadership Critical Outcome is **Outstanding**. The URA management team is working together effectively to achieve its programmatic and operational goals. The new appointments and organizational changes that took place in FY 2002 and 2003 are serving Fermilab well. URA also was proactive in establishing a Fermilab Director Search Committee in anticipation of the current Director's departure at the end of June 2005.

URA continued to use directed management reviews effectively to assess key Fermilab operations functions and management systems. Two significant URA-directed reviews were 1) the annual external Administrative Peer Review on October 8-10, 2003 and 2) the annual external review of the Fermilab Science Program on March 12-13, 2004. Highly qualified individuals performed the reviews and generated well-considered reports, which offered good recommendations for continued improvement and highlighted noteworthy practices. In addition to these reviews, the URA Board of Overseers actively monitored Fermilab's scientific, administrative, financial, internal audit, ES&H, and facilities management functions. URA leadership understands that outstanding management and operations are as important as outstanding science.

URA management also made substantial progress in addressing major issues related to Run II and safety. These two areas have been of significant concern to DOE over the last several years and it is clear that URA has responded to the concerns. URA's response involved its corporate leadership as well as its leadership at Fermilab. The URA Board of Overseers actively involved itself in both areas of concern. The new Run II management team that URA put into place provided the leadership that resulted in the best Fermilab performance to date with respect to Run II. There were major challenges with respect to Run II, and success was far from certain at the beginning of FY 2004. Run II's success in FY 2004 is due in large part to the disciplined and rigorous approach taken by the management team.

Respecting safety, Fermilab's FY 2004 record was the best in Fermilab history and compares very favorably with other SC laboratories. URA management has provided visible leadership in the flow-down and implementation of Integrated Safety Management System (ISMS) principles. In addition to the safety record as evidence, an independent DOE review and the DOE Site Office operational awareness program validated Fermilab's implementation of ISMS principles. Recommendations from DOE- as well as URA-commissioned reviews received appropriate responses. Nevertheless, URA recognizes that there is more work to be done in this area in order to meet SC goals and to reach best-in-class status. This recognition will be an important factor in ensuring continuous improvement.

Another area of concern to DOE over the last several years has been project management. As noted in last year's evaluation, URA instituted its own internal reviews (Director's Reviews) which "provided additional structure and discipline to Fermilab programs and projects." The internal reviews have paid off; Fermilab has successfully managed its responsibilities for the Large Hadron Collider, NuMI, CDF/DZero upgrade, and several smaller projects. The URA leadership, specifically the laboratory Director, made a necessary but difficult decision to reduce the scope of the CDF/DZero upgrade projects. DOE believes the decision was responsible considering the program's seriously constrained resources. One disappointment to DOE, however, was BTeV. The schedule for this project, as presented by URA to DOE in Spring, 2004, was not credible. Although the project was in a relatively early stage in the approval process, URA leadership misjudged DOE expectations. The U. S. high energy physics program is at a critical juncture and cannot afford a project failure. Any new projects that are undertaken must receive the necessary resources to succeed.

Finally, as noted above, an issue that arose during the year was the need to recruit a new laboratory Director. The current director announced his intention to step down in June 2005. URA quickly took steps to ensure continued strong laboratory leadership. URA established a Search Committee which identified several well qualified candidates by the close of the fiscal year.

In summary, URA leadership has done an overall outstanding job to ensure operational excellence and foster responsible stewardship of DOE resources. It has done this in a time of severe budget constraints, which can test the leadership and management skills of any organization. URA systematically reviewed its scientific and operational programs; effectively addressed important issues with one exception; and responded appropriately to review team recommendations. It was noted in last year's evaluation that a more proactive approach is needed. Evidence that URA is in fact being more proactive is apparent in the better quality of URA's self-assessment, in a greater

readiness to identify opportunities for improvement, and in the prompt efforts to initiate a search for a new Laboratory Director. While more work is still needed, URA leadership is on a good path forward.

C. MISSION SUPPORT

Critical Outcome: Manage and enhance business and management systems, work processes, and facility support to provide an effective and efficient work environment that enables the execution of Fermilab's mission.

1. **Scheduled Maintenance**
2. **Whitestone's Maintenance and Repair System (MARS)**
3. **Small Projects**
4. **Evaluation of Subcontractor Performance > $100K**
5. **Contract Awards to Achieve Socioeconomic Goals**
6. **Cyber Security - Continuous Availability of Computer Systems**
7. **Cyber Security – Data Protection from Cyber Attack**

DOE Rating: **Outstanding**

Scheduled Maintenance: DOE rates performance in the percentage of scheduled maintenance as **Outstanding** (Outstanding > 80%). Fermilab also rated its performance as outstanding and provided data to support that more than 80% of funds spent on maintenance were for scheduled maintenance.

Whitestone's Maintenance and Repair System (MARS): DOE rates performance for initiating the Whitestone MARS as **Outstanding** (Outstanding >10). Fermilab completed the Whitestone model on 35 buildings, which is well above the requirements established in the performance measure. Completion is an important step toward meeting new requirements in DOE Orders.

Small Projects: DOE rates performance in meeting small project milestones as **Outstanding** (Outstanding >90%). This rating is based on all 8 General Plan Project milestones scheduled for FY 2004 being completed on time. In addition, the one Accelerator Improvement Project scheduled for completion was accomplished ahead of schedule.

Evaluation of Subcontractor Performance >$100K: DOE rates performance in the area of evaluating subcontractor performance as **Outstanding** (Outstanding = 100%). Initiating this measure was critical two years ago to drive contract performance reviews prior to closeout; however, URA has changed its procedures to get comments on contract performance from all contract participants prior to closeout. This year, Fermilab reviewed 14 of 14 contracts over $100,000 against the DOE-approved checklist.

Contract Awards to Achieve Socioeconomic Goals: DOE rates performance in this area as **Excellent**. DOE has identified socioeconomic goals both in the Procurement Balanced Scorecard and in these critical performance measures. URA has performed as follows:

Business Category	*Metric*	*Score*	*Rating*
1. Small Business	Outstanding >5%	64%	Outstanding
2. Small Disadvantaged Business	Outstanding >5%	9%	Outstanding
3. Women-owned Business	Outstanding >5%	12%	Outstanding
4. Veteran-owned Business	Outstanding >1.5%	3%	Outstanding
5. Historically Underutilized Business (HUB) Zones	Good >2.5%	1.55%	Good
6. Service-Disabled Veteran-Owned Business	Unsatisfactory <1.2%	.001%	Unsatisfactory

DOE considered the challenges associated with procuring services in the last two categories and found the following circumstances.

In November 2004, DOE performed a computer search on the goals for: 1) Historically Underutilized Business (HUB) Zones; and 2) Service-Disabled, Veteran-Owned Businesses, using the Small Business Administration (SBA) computer, Dynamic Small Business Search. The results found no firms certified in Illinois meeting the search criteria. A search using the SBA Subcontracting Opportunities Directory also yielded no results. Although there may be firms registered in other states, the Fermilab Small Business Manager is trying to keep business in Illinois. These factors encumber URA's ability to meet fully the last two socioeconomic goals. DOE has requested that the Fermilab Small Business Manager develop a plan to address improvement in these two areas in the FY2005 self-assessment.

Cyber Security: DOE rates performance in the two performance areas for Cyber Security as **Outstanding**. The URA cyber security program has been effective in assuring continuous availability of computer systems required for operations. No instances of a cyber attack interrupting data-taking have occurred; consequently, no cyber attack has resulted in an irrecoverable loss of data.

D. SELF-ASSESSMENT

Critical Outcome: The self-assessment process will evaluate URA's ability to meet critical outcomes and meet performance objectives, measures and expectations, and to control its processes.

1. Self-Assessment Report is Utilized as a Management Tool in Laboratory Operation

DOE Rating: **Excellent.**

The DOE rating for the Self-Assessment Critical Outcome is **Excellent**. DOE agrees with URA's assessment that the laboratory "has continued to improve with each iteration" of its self-assessment process.

The objective is to use self-assessment as a management tool in the operation of the Laboratory. As contractually required, DOE used the following criteria to evaluate the quality of the annual self-assessment performed by the Divisions and Sections:

- The program/project/activity and its status is described;
- There is a basis for determining performance, e.g., procedures, business systems, records, tracking/trending, performance reviews, statistics, etc.;
- Successes are identified;
- Weaknesses and needs for improvement are identified; and
- The path forward (e.g. plan, schedule) to address needs is identified.

Although the current Self-Assessment Report is an improvement upon prior efforts, URA's performance against the above criteria remains uneven. Some Divisions and Sections fully met expectations, but others did not. Peer reviews continued to provide important input into the self-assessment process; and these peer reviews have been useful tools in improving performance over the last several years. This is especially true of Run II. It is doubtful that Run II would have been as successful in FY 2004 without critical self-examination.

In the administrative area, the annual Administrative and Operations Support Review has provided excellent recommendations for improvement, particularly in the areas of strategic planning, succession planning, and workforce planning. Some of these recommendations are repeats from prior reviews, but URA management has not developed a path forward to address these recommendations. If URA management were to do so, the Laboratory as an institution could be significantly strengthened.

In summary, the URA Self-Assessment Report continues to improve, but URA is not yet fully utilizing the self-assessment process as a management tool to improve performance.

Attachment 1

Office of Science
FY 2004 Appraisal of
Fermi National Accelerator Laboratory

Department of Energy
Office of Science
Washington, DC 20585

Office of the Director

February 2, 2005

Dr. Joanna Livengood
Acting Site Manager
Fermi Site Office
U.S. Department of Energy
P.O. Box 500
Batavia, Illinois, 60510

Dear Dr. Livengood:

For fiscal year 2004 the Fermi National Accelerator Laboratory's (FNAL) overall performance on Office of Science (SC) science and technology programs is rated as Outstanding. This rating relates to a scale that includes Unsatisfactory, Marginal, Good, Excellent, and Outstanding. It is based on performance evaluations provided by all the program managers in SC's Office of High Energy Physics (HEP) who oversee program elements at FNAL.

The Fermilab research program encompasses accelerator based physics, non-accelerator based physics, theory, and technology R&D, dominantly accelerator R&D. The DOE conducted a review of facility operations in March 2004. The conclusion of the review was that the lab was well managed but faced a variety of technical and programmatic risks. Management is aware of the risks and is taking steps to address them. The theoretical work in particle physics and astrophysics received high marks from the DOE annual program review. The theory group has become more deeply involved in long range planning. Also of note was the selection of Vladimir Shiltsev of the Accelerator Division for the European Physical Society's early career prize in accelerator physics.

During this performance period, URA continued to show improvement in safety performance as measured and reported by three performance measures for: 1) Days Away, Restricted, Transferred (DART); 2) Total Recordable Case Rate (TRCR); and 3) control of radioactive materials and exposures to ionizing radiation. I firmly believe that safety and security are integral parts of producing outstanding science. To assure that this area of performance will receive continued attention in the future, the Office of Science will be revising the methodology by which we score performance. We anticipate changing the method for calculating fee from an "additive model" in which operational performance is a minority percentage of the overall score to a "gateway model" in which the S&T score sets the maximum earnable fee within the total available fee defined by the contract, and the Operational score determines how much fee is actually earned.

The full narrative evaluation from HEP is also attached.

Sincerely,

Raymond L. Orbach
Director
Office of Science

Enclosures

Enclosure 1

OFFICE OF SCIENCE
FY 2004 APPRAISAL OF
FERMI NATIONAL ACCELERATOR LABORATORY

Measure 1: Quality of Research
Rating: **Outstanding (3.8)**
Weighting Factor = 0.30

Measure 2: Success in Constructing and Operating Research Facilities
Rating: **Outstanding (3.9)**
Weighting Factor = 0.25

Measure 3: Effectiveness and Efficiency of Research Program Management
Rating: **Excellent (3.4)**
Weighting Factor = 0.15

Measure.4: Relevance to DOE Missions and National Needs
Rating: **Outstanding (3.9)**
Weighting Factor = 0.05

OVERALL WEIGHTED S&T RATING: Outstanding (3.8) *

SCORING RANGES FOR FERMI NATIONAL ACCELERATOR LABORATORY:

Outstanding	**3.5 - 4.0**
Excellent	**2.5 - 3.49**
Good	**1.5 - 2.49**
Marginal	**0.5 - 1.49**
Unsatisfactory	**0.0 - 0.49**

* Normalized to 100%

Office of Science
Office of High Energy Physics
FY 2004 Performance Appraisal for Fermi National Accelerator Laboratory

This evaluation is based on peer reviews conducted by the Department of Energy, the laboratory's self-assessment, and reports by advisory committees commissioned by the contractor, Universities Research Association (URA), and the laboratory. The review of Tevatron luminosity held in February 2004, the Tevatron Operations review in March 2004, the annual program review in March 2004, and the mini-review of Tevatron luminosity held in September 2004 were all considered in this evaluation, as well as the reports from DOE reviews of the NuMI, CMS, and LHC accelerator projects. The report from the URA visiting committee, reports from the Fermilab Program Advisory Committee and the Accelerator Advisory Committee provided valuable input to this analysis.

1. Quality of Research

The results of research in FY 2004 were dominated by CDF and D-Zero analysis using data from Run II of the Tevatron. Run II is the largest research program in U.S. high energy physics. There were results on many topics studied in Run II: top quark physics, weak bosons, supersymmetry and other new phenomena, QCD, and flavor physics. There were multiple measurements of top quark production reported by each experiment. Searches for charged Higgs Bosons and supersymmetry, measurements of B meson and B baryon lifetimes have been made public. Both experiments have confirmed the X(3872) meson discovered by the Belle collaboration.

There were important results from both CDF and D-Zero on B_s physics. The B_s is not produced at the B-factory and currently can only be studied at CDF and D-Zero. CDF published a world's best limit on $B_s \rightarrow \mu^+\mu^-$. D-Zero has produced the world's best measurement of the B_s lifetime.

A very interesting result for the mass of the top quark from D-Zero was published in Nature, which has wide circulation but is not a traditional journal for particle physics. The result is based on a new analysis of data from Run I data, and provides a measurement more precise than any previous one. The average of all top quark masses measurements is increased to 178 GeV/c^2, which has interesting implications on the allowed mass of the Higgs boson with the 95% confidence level upper limit going from 219 GeV/c^2 to 251 GeV/c^2.

Another interesting new result came from the Cold Dark Matter Search (CDMS) collaboration, which set a new limit on WIMP cross sections. This limit is the new world's best and clearly excludes the previous claim of a signal by the DAMA experiment.

The Sloan Digital Sky Survey continues to produce a wealth of astronomical data. There were two major releases to the public in FY 2004. Each contained about 6

Terabytes of data. A new result on cosmic clustering uses quasars to map the distribution of gas between galaxies and to measure how clumpy the gas is on scales of one million light years. This indicates how dark matter is distributed in the universe and has important implications on inflation, dark energy, and neutrino mass.

The theoretical work in particle physics and astrophysics received high marks from the DOE annual program review. The theory group has become more deeply involved in long range planning. The theory groups were deeply involved in preparing Fermilab's recent long range plan, and theorists, Rocky Kolb and Joe Lykken, as well as Fermilab staff John Womersley and Judy Jackson, were members of the HEPAP subpanel that wrote the very influential Quantum Universe report.

In the area of accelerator R&D, the most notable result was that Fermilab built the first RF accelerating structure to meet the NLC specifications for breakdown rate at the design voltage gradient. The laboratory also makes strong contributions, in light of the limited available funding, to both the theory and practical realization of muon accelerators.

Also of note was the selection of Vladimir Shiltsev of the Accelerator Division for the European Physical Society's early career prize in accelerator physics.

The rating is increased from FY 2003 to **3.8**, an **Outstanding.**

2. <u>Success in Constructing and Operating Research Facilities</u>

Fermilab continues to manage the successful construction of the NuMI/MINOS, U.S. CMS, U.S. LHC Accelerator, Run IIb CDF and D-Zero Detector Projects.

The NuMI Project was 99% complete at the end of FY04, and is in the final stages of installation and checkout with commissioning scheduled for early in FY05. The project remained on schedule and under budget. We expect that nearly $1 million will be returned to the Treasury. The conventional construction was completed and the detector and beam-line components nearly complete. All five DOE Level 2 milestones were completed well ahead of schedule. In addition, one of the FY05 DOE Level 2 milestones was completed. With the settlement of S.A. Healy claims, the major element of project risk was resolved. The NuMI/MINOS project was consistently rated throughout FY04 as "GREEN" in the DOE Project Assessment Reporting System (PARS).

Run IIb CDF and D-Zero Detector Projects proceeded well during the fiscal year. At the end of the fiscal year, the CDF and D-Zero projects were 43 percent and 32 percent complete, respectively, based on costs. Both projects are on track to be completed on schedule and within cost. Significant accomplishments during the year included: CDF made sufficient progress to install the CDF Preshower and Crack detectors during the accelerator shutdown that began at the end of the fiscal year. D-Zero received most of the Layer 0 sensors from the vendor and began testing these

and the hybrids for the silicon system. The CDF and D-Zero Detector Projects have been rated consistently throughout FY04 as "GREEN" in PARS.

The management of the LHC accelerator construction project is provided by Fermilab. Work is carried out at three national labs, Brookhaven National Laboratory, Lawrence Berkeley National Laboratory, and Fermilab. The overall project progressed from 89% complete to 96% complete based on earned value. Progress on Fermilab's scope of work was demonstrated in successfully completing and shipping the first Q2 and Q1 type quadrupoles to CERN.

DOE reviews and assessments also support the conclusion that there has been good technical progress on U.S. CMS in all detector sub-systems. The project progressed from 80% to 88% completion based on earned value, and was on track to meet the CD-4A milestone set for the end of FY05. Cost and schedule performance remain within acceptable ranges. The project was also consistently rated "GREEN" during FY04 in the DOE PARS system. U.S. CMS has adequate contingency to complete current baseline scope. The project fully anticipates fulfilling its commitments to CMS on or before the milestone dates in the current CMS international schedule. U.S. CMS also made excellent progress completing U.S. agency/directorate milestones. The project developed a reasonable Endgame plan for a two-phased completion of the detector in coordination with international CMS. Particular project successes by Femilab include (i) playing a critical role identifying and solving a number of CMS component problems in the Silicon Tracker that will greatly improve sub-detector quality, (ii) progress in production and testing of calorimeter and other electronics, including a combined study of detector components read out simultaneously in a test beam at CERN, (iii) integration and coordination with CERN of low voltage power supplies and electronics, (iv) progress on R&D and tests of forward pixel detectors, and (v) progress on the design of a field-mapping device for the CMS solenoid.

Tevatron Operations exceeded both the contract goals and the laboratory's design goals. The Tevatron ran more reliably and with higher instantaneous luminosity, yielding a substantial increase in integrated luminosity. The machine is now understood better and is more stable, which provides opportunities for additional improvements.

The performance of the Tevatron against the metrics in the contract yields Outstanding in all three cases: store hours, integrated luminosity, and best integrated luminosity over seven consecutive days. In all three cases, the performance exceeded the criteria for Outstanding.

Much of the gain in FY 2004 is due to improvements in stability and reliability of the entire accelerator complex, such as the alignment of the Tevatron, tuning of the beam-abort systems to prevent damage to the accelerator and detector components, implementation of beam studies that provide needed data without overly perturbing the machine that can be used to revert smoothly back to regular running, better

modeling of the machine systems that led to longer stores and higher integrated luminosity, and modifications to the Booster "dogleg" to reduce losses in the Booster. Also, a new Tevatron lattice was implemented that significantly improved the focusing at the interaction regions and thereby increased the luminosity by about 20%.

The Run II upgrades have proceeded well. The Main Injector RF has been upgraded, which will provide slip-stacking of protons. Slip-stacking has been tested at proton intensity up to 7×10^{12}, and the mini-review committee stated that this close to the design goal of 8×10^{12} to be achieved by the end of fiscal year 2005, as scheduled. Newly constructed separators for the Tevatron have been installed. The Tevatron BPM upgrades are proceeding and will be commissioned in FY 2005. Electron cooling tests have been completed and the equipment has been moved to its new location near the Recycler.

The Recycler was successfully commissioned in FY 2004. The Recycler is a critical component of the Run II upgrade plan, and it has been used successfully in operations earlier than planned. This gave a boost to the instantaneous luminosity and demonstrated that the Tevatron could handle luminosities of 1×10^{32} $cm^{-2}s^{-1}$.

One technical goal that is still to be attained involves the expected antiproton stacking rate. According to the report from the September DOE mini-review, the ten store average antiproton zero-stack stacking rate is $12.7x10^{10}$/hour, compared to a design goal of $18x10^{10}$/hour and a base goal of $13.7x10^{10}$/hour. The problem was discussed in detail during the mini-review, and there was evidence that this can be dealt with. The report noted a significant improvement in the understanding of the stacking rate made possible by improved instrumentation and diagnostics.

The MiniBoone neutrino data sample increased faster this year than last due to better proton production from the Booster. With these improvements the MiniBoone neutrino oscillation result is expected to be ready in 2005.

The BTeV project was successfully reviewed for CD-1, but not without some difficulty. The cost estimate and the technical scope were adequate, but the originally proposed schedule was not credible. A new schedule was quickly developed and found to be satisfactory.

The DOE conducted a review of facility operations in March 2004. The conclusion of the review was that the lab was well managed but faced a variety of technical and programmatic risks. Management is aware of the risks and is taking steps to address them.

The overall performance on construction management continued to be top-notch with all construction projects progressing well. The performance of the lab in Tevatron operations improved substantially. Both areas merit an outstanding and the overall evaluation in this area is **3.9, an Outstanding**.

3. Effectiveness and Efficiency of Research Program Management

The Fermilab research program encompasses accelerator based physics, non-accelerator based physics, theory, and technology R&D, dominantly accelerator R&D. For guidance on topics in accelerator-based and non-accelerator research the lab has used its Program Advisory Committee (PAC) to set its research priorities. The lab uses its Accelerator Advisory Committee (AAC) to peer review both its accelerator operations and its program of accelerator R&D.

Fermilab's long-range plan was released in FY 2004. It was a two-pronged plan featuring the International Linear Collider (ILC) and a neutrino program based on a megawatt-class proton accelerator. Consultants from the annual program review found the plan to be sensible and appealing. Both fields are scientifically compelling. The technological synergy between the two options was also found to be sensible.

Since the decision on superconducting RF technology for the ILC, Fermilab has increased its efforts planning for the ILC. They have proposed hosting the Global Design Initiative and coordinated with other DOE labs on the design of a superconducting RF test facility.

As host to the nation's current accelerator neutrino program, it was wise for the lab to be strongly involved in the APS neutrino study through the contributions of the Fermilab staff and users. Boris Kayser was a co-chair of the study and others were represented on the organizing committee, writing committee, and in the working groups.

The transition from Run II to LHC has received a great amount of attention at Fermilab and in the broader community. The matter has been discussed at the DOE annual program review, Tevatron operations review, the PAC, CDF and D-Zero International Finance Committees and HEPAP. The lab is working on new Memoranda of Understanding with collaborators to identify needs and manpower available to the Run II experiments for the next several years. It is still not clear whether there will be adequate resources to carry Run II though to 2009 the lab's planned date for concluding the run.

The lab has also started a Physics Analysis Center for the LHC program that will give CDF and D-Zero collaborators more opportunities to participate in LHC physics, while still being involved in Run II. The assessment by the annual program reviewers was in general positive, however some concerns were also expressed that younger researchers might not be able to split their efforts and remain effective.

The lab has also started a Particle Astrophysics Center to bring its various theoretical and experimental astrophysics efforts together. This also received mixed reaction from the annual program review while the URA visiting committee was enthusiastic. The Visiting Committee stated that the center will help in making a coherent particle

astrophysics program, but the annual program review consultants expressed the opinion that astrophysics should have strong contacts with the rest of the lab rather than being segregated.

Maintaining this strong and diverse program in the face of budget constraints is a continuing challenge for lab management.

During this performance period, URA continued to show improvement in safety performance as measured and reported by three performance measures for: 1) Days Away, Restricted, Transferred (DART); 2) Total Recordable Case Rate (TRCR); and 3) control of radioactive materials and exposures to ionizing radiation. DOE intended that these performance measures foster management and operations systems and practices that protect the safety and health of the Fermilab workforce, subcontractors, the community, and the environment in all SC program activities. URA achieved DART and TRCR rates of 0.4 and 1.2, respectively, which translates to Outstanding performance against the metric for Fermilab and subcontractor employees combined. Respecting radiation control, no unplanned radiation exposures occurred during the performance period. URA also documented 17 credible reviews, which yielded innovations or improvements to control radiation exposures more effectively. DOE also rates URA performance against the radiation control metrics as Outstanding. These collective improvements contributed to achieving overarching SC goals for its laboratories.

The OHEP evaluation is increased from FY 2003 to **3.4 (Excellent)**.

4. <u>Relevance to DOE Missions and National Needs</u>

There were no significant shifts in the program this past year, so the relevance to DOE missions and national needs is unchanged. Our comments are therefore similar to last year's. The lab's physics priorities are still well aligned with those of the national HEP program, as they must be for a flagship program. Tevatron Run II is one of the highest national HEP priorities due to its potential for significant discoveries. FNAL is also the center of U.S. effort in neutrino physics, and maintains important efforts in B-meson physics, complementary to those at the SLAC B-factory. FNAL also provides management and research expertise to several forefront experiments in particle astrophysics. Efforts in accelerator R&D and detector and information technologies are providing the tools needed for next-generation experiments. As host laboratory for the U.S. CMS experiment, as well as the future U.S. CMS computing center, the lab has carried out an important leadership role for this vital future experiment at the LHC over the last few years. FNAL is also host laboratory for the U.S. LHC accelerator effort, and is making important contributions of magnets for the LHC accelerator project. The rating is **Outstanding (3.9).**

Weighted Average for Science: 3.8 (Outstanding)